SIX DOLLARS

A CAHNERS PUBLICATION

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER & SYSTEMS COMPANIES — WORLDWIDE

MARCH 5, 1990

SPECIAL REPORT

WASHINGTON Puts electronics on its agenda

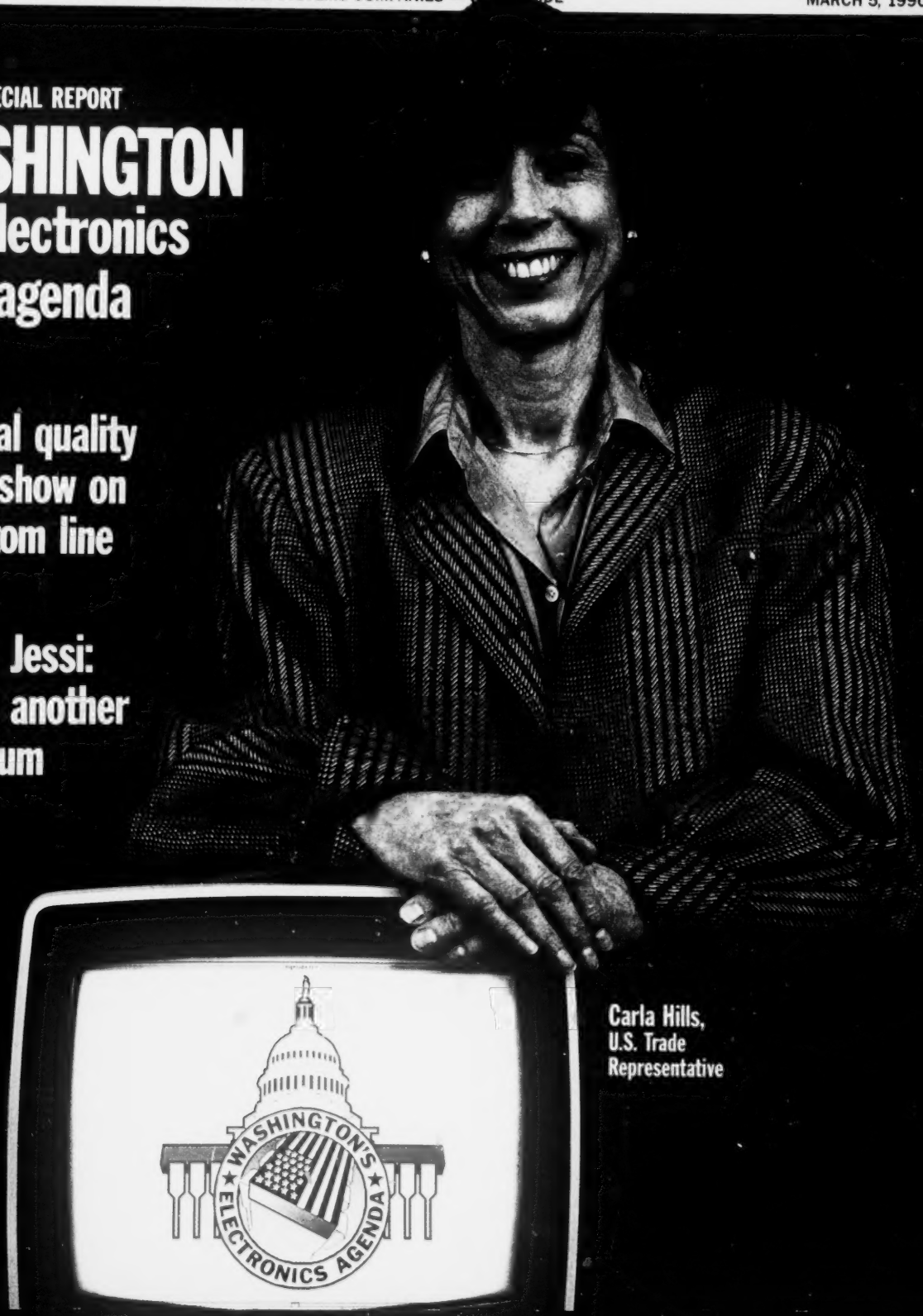
PAGE 18

Why total quality doesn't show on the bottom line

PAGE 38

Europe's Jessi: Not just another consortium

PAGE 42



Carla Hills, U.S. Trade Representative

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES—WORLDWIDE

VOL. 16, NO. 5

MARCH 5, 1990

Cover photograph: Howard Davis

PAGE 18 U.S. Trade Representative Carla Hills: Taking a tough new posture on international trade

COVER STORY/WASHINGTON'S AGENDA

18 Who speaks for electronics in Washington?

U.S. Trade Representative Carla Hills has put the U.S. electronics industry high on her agenda. So have the president, key members of his administration and, across town on Capitol Hill, several members of the Senate and House. Getting on the agenda is one thing; generating results is another. Can America's biggest and fastest growing industry finally get a fair hearing in Washington?

BUSINESS TRENDS

13 Mobile satellite systems get ready to roll

New ultra-compact, low-cost satellite receivers are expanding into a variety of exotic applications. Navigation and logistics management are two of the biggest growth markets.

WASHINGTON'S AGENDA

18 Who speaks for electronics in Washington?

Until recently, electronics received only a polite hearing in Washington. Now the president and Congress are waking up to the importance of America's biggest industry. Several top priorities for the electronics industry have already found their way onto the Washington agenda for action this year.

20 Champions of the electronics industry on Capitol Hill

22 Key legislation to watch this year

26 Electronics lobby asks for trade protection, tax cuts

U.S. electronics companies want Congress and the administration to supply weapons for defense against foreign firms attacking U.S. markets. On the short list are tax cuts and stronger trade protection; on the long list are changes in antitrust law, education assistance, and capital investment incentives.

28 Foreign lobbyists: A fifth column inside the Capitol?

29 The electronics industry's Washington objectives

30 Key electronics and computer industry lobbying groups

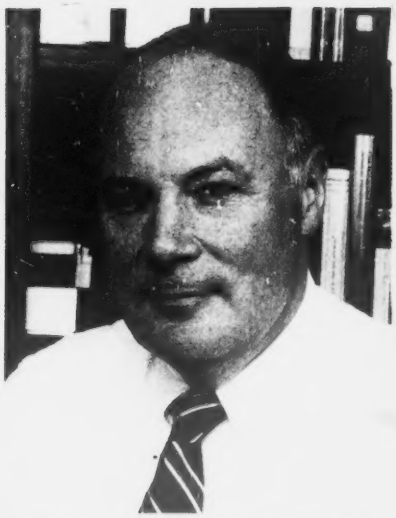
34 Knock knock, Japan. U.S. chip makers still want in

Japan continues to make all the motions of opening semiconductor markets to U.S. sales as required by the semiconductor trade agreement, but the numbers belie that commitment. If Japan continues to do little, will the U.S. do the same — or finally get tough?

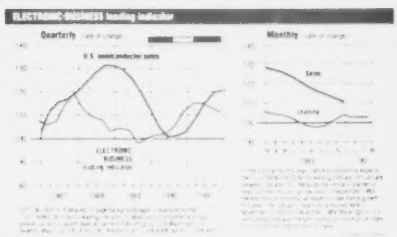
MANAGING RESOURCES

38 Why aren't quality programs boosting industry profits?

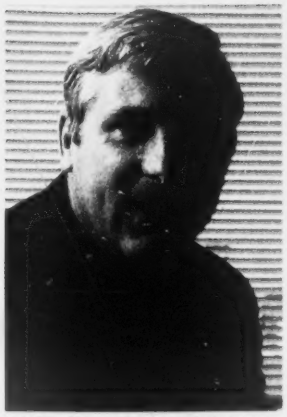
Firmly entrenched in the factories of the 19th century, today's accounting standards are incapable of measuring all the gains from innovation in electronics production. But that hasn't stopped most managers from implementing corporate quality programs. Next step: Quality programs for accounting.



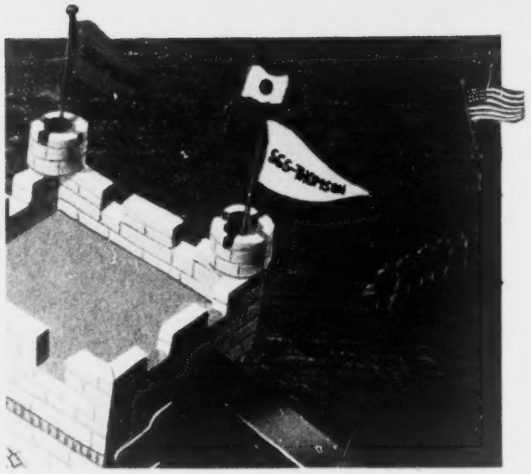
PAGE 38 Coopers & Lybrand's Bill Wheeler: Why aren't quality programs boosting industry profits?



PAGE 73 Business Barometer: Stable growth



PAGE 26 AEA's Bill Krist: Electronics lobby asks for trade protection, tax cuts



PAGE 42 Can the barons of Jessi save Europe's chip makers?

PAGE 34 Lattice's Steve Donovan: U.S. chip makers still want into Japan

PAGE 53 Motorola Hong Kong's Tam Chung Ding: Bets big on the China card

EUROPE BUSINESS

42 Can the barons of Jessi save Europe's chip makers?

Europe's big three — Siemens, Thomson and Philips — have formed their own $4 billion submicron-chip R&D consortium to defend against Japanese and U.S. thrusts into European markets. They must be on to something — U.S. firms are lining up behind IBM to try to join the continental club.

ASIA/PACIFIC BUSINESS

53 Motorola bets big on the China card in Hong Kong

Despite impending political changes in Hong Kong, Motorola is gambling that Asia will remain a key market for its chips and plans to stay in Asia well past 1997.

MARKET PERSPECTIVES

61 Home medical devices show healthy sales, sick profits

A growing market for cost-cutting home health care is sweeping the nation; but even the strongest players in the medical electronics industry are finding that even though health care insurance covers a lot, it doesn't include profits in the reimbursement equation.

BUSINESS BAROMETER

73 Economy

Real gross national product will grow 2.1% in 1990 and 3.0% in 1991

74 Leading indicator

The electronics industry can expect to see stable growth this year.

DEPARTMENTS

5 Inside Business

9 Upstarts

Areal Technology, Parallan Computer, Synernetics

69 My View

To leave a message press #1

70 Advertiser index

76 Viewpoint

How to build new consumer electronics products and services

COMPANIES IN THIS ISSUE

66 An index of the companies covered in this issue.

EDITORIAL STAFF

Publisher: Frank J. Burge

Editor: Jeffrey Bairstow

Managing Editors: J. William Semich, Roger C. Plant

Senior Editors: Linda Stallmann (Financial), Bruce C. P. Rayner, Rick Whiting, Barbara N. Berkman

Associate Editors: Anthony E. Greene, Michael R. Leibowitz

Assistant Editors: Peter L. Burrows, John McCreadie, Xiong Xiaoge

Section Editor: Marvin V. Greene

Copy Editor: Barbara Jorgensen

Research Editor: Michelle D. Doses

Contributing Editors: Elizabeth Baatz (Cahners Economics), Dwight B. Davis (Boston), H. Garrett DeYoung (Boston), Madeline Franchi (Cahners Economics), Sarah Glazer (Boston), Shohei Kurita (Tokyo)

Consulting Editors: Alberto Socolovsky, Allen Furst

Production Editor: Karen J. Covey

Editorial Assistant: Jean O'Brien

ART STAFF

Art Director: Michael Roach

Associate Art Director: Carla Aguilar Leeder

Staff Artist: Michele G. Kane

EDITORIAL OFFICES

Boston: Cahners Building
275 Washington Street, Newton, Mass. 02158
(617) 964-3030 Telex: 94 0573 CPC BSN
Fax: (617) 558-4327 MCI: EBBOS

Washington, D.C.: Anthony E. Greene
1333 F Street, N.W., Suite 720
Washington, D.C. 20004 (202) 628-2773

San Jose, Calif.: Michael R. Leibowitz
Sherman Building, 3031 Tisch Way, Suite 100
San Jose, Calif. 95128 (408) 296-0868

Northwest: Paula Doe
5011 133rd Place SE
Bellevue, Wash. 98006 (206) 641-0903

London: Barbara N. Berkman
27 Paul Street
London EC2A4JU England 011-44-1-628-7030
Fax: 011-44-1-628-5984

PRODUCTION

VP Production: Wayne Hulitzky

Director of Production/Manufacturing: John R. Sanders

Production Supervisor: Andrew A. Jantz

Production Manager: Betsy Harkins; (617) 964-3030

CIRCULATION

Circulation Manager: Ann Ward
44 Cook Street, Denver, Colo. 80206
(303) 388-4511

Total Circulation: 77,804

REPRINTS

ELECTRONIC BUSINESS articles are available on a custom printing basis at reasonable prices. Contact Andrea Marwitz, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., P.O. Box 5080, Des Plaines, Ill. 60018 (708) 635-8800
Electronic Business can be purchased on 35mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106

What has Washington done for you — today?

What does it take to change the direction of the federal juggernaut?

Today, something more than a crisis. Because the nation's biggest industry — electronics — has long passed the kind of crisis condition that generated swift action in Washington in times past when lobbyists for U.S.-made steel, autos, textiles, big oil, or agriculture knocked on Uncle's door.

Many of these same aging industries — far less important now to the economy than is electronics — are still enjoying the fruits of past victories in Washington in the form of trade restraints, tax benefits, federally backed loans and other special benefits, all custom ordered by the old-tech lobby.

So what is Washington doing for the electronics industry today?

Nothing near as big as that — yet. But the Bush administration and Congress are finally making all the signs of moving in the right direction.

U.S. Trade Representative Carla A. Hills has set the tone for the administration's more aggressive stance. But whether she can successfully turn her get-tough "handshake and a crowbar" trade strategy into positive action by Japan and Europe to allow the United States unrestricted access to their markets still must be tested.

In this issue's three-part special report on Washington's Electronics Agenda by Washington correspondent Tony Greene, San Jose correspondent Mike Leibowitz and contributing editors Garrett DeYoung and Dwight Davis, you'll be able to judge for yourself what level of commitment to the electronics industry to expect from Washington this year.

U.S. Trade Representative Carla Hills has a special interest in the electronics industry. But will she use a crowbar to force foreign markets to open wide?

An early example of Hills' success with the crowbar — Japan's agreement to increase the U.S. share of semiconductor sales there — could signal the long-awaited change in direction in Washington.

But according to Leibowitz, the whole story is not yet in on that one either. Yes, Japan has committed to increase the foreign share of its chip market to 20% by 1991; but they have yet to act on that commitment — foreigners still only hold an 11% share of Japan's chip market, virtually the same share as in 1982. Conversely, Japan's share in the U.S. chip market has grown from 10% then to 24% today.

Carla, where'd you put that crowbar?

J. WILLIAM SEMICH, managing editor

ELECTRONIC BUSINESS® (ISSN 0163-6197) is published bi-weekly, except monthly in December, by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington Street, Newton, MA 02158-1630. Terrence M. McDermott, President; Frank Sibley, Senior Vice President/General Manager, Boston Division; Jerry D. Neth, Senior Vice President/Publishing Operations; J.J. Walsh, Senior Vice President/Finance; Thomas J. Dellamaria, Senior Vice President/Production and Manufacturing; Ralph Knupp, Vice President/Human Resources. Circulation records are maintained at Cahners Publishing Company, 44 Cook Street, Denver, CO 80206-5800. Telephone: (303)388-4511. Second-class postage paid at Denver, CO 80206-5800 and additional mailing offices. POSTMASTER: Send address corrections to ELECTRONIC BUSINESS® at the Denver address. ELECTRONIC BUSINESS® copyright 1990 by Reed Publishing USA; Ronald G. Segel, Chairman and Chief Executive Officer; Robert L. Krakoff, President and Chief Operating Officer; William M. Platt, Senior Vice President. Annual subscription rates for non-qualified people: USA/Canada/Mexico, $69.95 per year; other countries, $110 per year (including air freight); $210 per year for air mail. Except for special issues where price changes are indicated, single copies of regular issues are available for $10.00 (USA, Canada/Mexico and foreign). Please address all subscription mail to Eric Schmierer, 44 Cook Street, Denver, CO 80206-5800. Cahners Publishing Company, A Division of Reed Publishing USA • Specialized Business Magazines for Building & Construction • Manufacturing • Foodservice & Lodging • Electronics & Computers • Interior Design • Printing • Publishing • Industrial Research & Technology • Health Care • Entertainment. Specialized Consumer Magazines: American Baby • Modern Bride.

BPA ABP

Motorola bets big on the China card in Hong Kong

Despite impending political changes in Hong Kong, Motorola is gambling that the Asia-Pacific region will remain a key market for its chips

BY ROBIN AGARWAL

Fears over the impending transfer of Hong Kong in 1997 by the British to the People's Republic of China have made many foreign and local high-technology manufacturers wary of long-term commitments of resources to research and development projects.

But not Motorola Inc.

The Asia-Pacific region is Motorola's second most profitable market after the United States, says Tam Chung Ding, the 45-year-old general manager of Motorola Semiconductors Hong Kong Ltd. He predicts that the market there for chips will thrive as living standards in the region continue to rise. Business International Forecasting Services, a unit of New York-based consultancy Business International Corp., predicts average private consumption in Hong Kong, Taiwan, South Korea, Japan and Singapore will increase 6.6% in 1990.

Increasing household purchases of goods and services, which include high-tech products, mean increased business for Motorola. Many consumer electronics goods on the market already use Motorola semiconductors. Bucking today's conventional wisdom, which predicts a politically and economically uncertain Hong Kong under the conservative Chinese government, still makes sense for Motorola.

Motorola's long-term Hong Kong strategy comes into play at a time when many foreign electronics companies in the territory are seeking to move their operations to more stable locations. Motorola is betting that China will not inhibit Hong Kong's freewheeling economy, and the Schaumburg, Ill., giant is investing based on that belief.

The Asia-Pacific region (particularly Hong Kong, Taiwan, South Korea and Singapore) is the world's fastest-growing area in terms of chip consumption. Hong Kong's semiconductor consumption increased 37.3%, to $810 million, in 1988 and was expected to jump another 21%, to $980 million, last year, according to market research firm Dataquest Inc.

In the territory covered by Motorola's Hong Kong headquarters are marketing and sales offices, and the company has manufacturing facilities in 10 countries in the Asia-Pacific region. In Japan, however, a separate subsidiary — Motorola Semiconductors Japan Ltd. — does its own manufacturing and design.

According to Tam, his region accounted for about $391 million, or about one-seventh of Motorola's total semiconductor sales of $2.7 billion in 1988, up 25% over the previous year. Motorola is the fourth-largest chip manufacturer in the world and the largest U.S. manufacturer. Its semiconductor operations are credited with 32% of its total 1988 sales of $8.25 billion.

Mike Theiler

Tam Chung Ding, general manager of Motorola Semiconductors Hong Kong: Confident about Hong Kong's future

New chip facility

Motorola is investing heavily in a new 326,000 square foot, three-story semiconductor-manufacturing facility in Hong Kong's New Territories. Dubbed Silicon Harbor Center, the new plant is located in Tai Po Industrial Estate, on the waterfront next to Hong Kong's Tolo Harbor. Production is scheduled to begin mid-year. Motorola won't disclose the cost of the project, but Hong Kong technology analysts estimate it at between $400 million and $600 million.

Products to be designed and manufactured at the facility include high-density dynamic RAMs, application-specific ICs and bipolar ICs. And while Silicon Harbor doesn't approach the size of some of Motorola's huge facilities in other Asian countries, Tam says the state-of-the-art computer-aided design, manufacturing and integration (CAD/CAM/CIM) technology employed at Silicon Harbor is a generation ahead of that in the United States and Europe.

In Hong Kong, Motorola currently does semiconductor design, assembly and testing, but no wafer fabrication — that is done in either Japan or Malaysia. With the completion of the Silicon Harbor facility, Motorola will perform the entire manufacturing process locally.

"The choice of the location," says Tam, in a report on the facility, "reflects Motorola's confidence in local government's interest in building infrastructures that allow a dynamic high-technology industry to grow."

"We have no intention of slowing our expansion," says Andre Borrel, corporate vice president and general

manager of Motorola's International Semiconductor Group, based in Phoenix, Ariz. "We believe more than ever in the long-term viability of Hong Kong as a regional business center and semiconductor manufacturing and testing site."

Not only does Tam insist that Motorola is confident about Hong Kong's continued viability — which other companies have echoed — but he also believes that the situation of California's Silicon Valley, with its mutually profitable high-tech alliance of industry and academia, can be replicated in Hong Kong.

Shortage of engineers

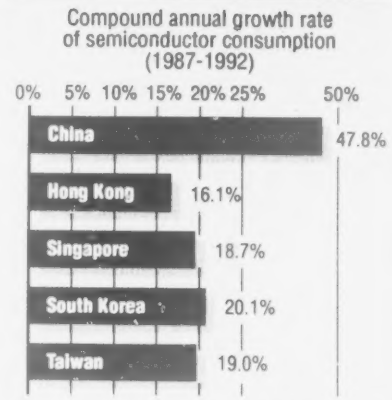
Despite Motorola's public confidence, some critics say the Silicon Harbor Center project is overly ambitious. They argue that a number of obstacles may be difficult to overcome and could spell trouble for Motorola's ambitions for the territory and for itself. The toughest obstacle, which has affected a range of manufacturing areas but especially high-tech industries, is a shortage of trained engineers.

Although the territory's universities have sufficient academic programs to train electronics engineers in sophisticated design, graduates are emigrating as fast as they are trained, leaving Hong Kong for destinations such as Canada, Australia and the United States. Talented Hong Kong engineers can find better salaries and job opportunities abroad, where there is less political and economic uncertainty.

Through its new semiconductor facility, Motorola hopes to boost, by example, the confidence of Hong Kong's electronics industry. Tam says that for Silicon Harbor Center to be a success, it must be a joint effort between industry, government and the universities. Although the Hong Kong government so far has been almost as reluctant to commit itself to long-term projects as private industry, it does seem anxious to cash in on the mushrooming growth of semiconductor usage.

Historically, Tam explains, the Hong Kong government has adhered to a low-profile policy of "positive non-intervention" in economic policy, which includes the high-tech industry. This has translated into a refusal to plan or direct the electronics industry in a way beneficial to Hong Kong, according to Tam.

The odds favor Motorola In Asia



Source: Dataquest Inc.

"They say they don't know how [to plan technology]," Tam says, "that we should just do R&D on our own projects. But we'd be much better off with [some central planning]. They're starting to realize that if you don't have an [R&D] base, you'll never have anything."

Although it has not yet been formally announced, Tam says one of the government's "well-known secrets" is its intention to fund an ASIC design training center through its Vocational Training Council. It would be the first time the government has reversed its laissez-faire attitude and invested in technology planning.

Some critics say Motorola's Silicon Harbor Center project is overly ambitious

The government-funded Vocational Training Council supervises eight technical institutes and 13 training centers in Hong Kong. Linked to four satellite sites (Hong Kong University, Chinese University, City Polytechnic and Hong Kong Polytechnic), the center intends to train 272 engineers a year.

The government has also enlisted the assistance of several U.S. companies, including Motorola, Hewlett-Packard Co., and Mentor Graphics Corp. to provide technological support for the center. A steering committee, led by Joshua Wong, head of Hong Kong Polytechnic University's electronic engineering department, and comprising industry representatives and academics, will set direction and develop government policy recommendations.

An ASIC for Dragons

Motorola's investment in Hong Kong's high-tech future has already begun to pay off. Motorola's DragonKat, the first single-chip, eight-bit application-specific microprocessor ever developed in Hong Kong, has been hailed as a triumph of local engineering by the government, receiving the Hong Kong Governor's Award for Industry in June 1988, the Chinese Year of the Dragon. Its highly integrated design is intended to allow the creation of new miniaturized consumer products, such as hand-held personal organizers, multilanguage translators and portable telecommunications equipment.

To improve its technical position in Asia, Motorola has embarked on what Tam calls "strategic alliances." Most notable recently has been an alternate-sourcing agreement, with ACC Microelectronics Corp. of Santa Clara, Calif., to produce a personal computer chipset. With just 25 employees, most of whom are engineers, the three-year old Silicon Valley company is quite small — but Tam seems satisfied that they were a good choice for Motorola.

"They were a better match than all the other companies we looked at," he explains. "I looked at the number of people and the number of products, and I thought, 'Gee, they really have expertise.' In this field, expertise makes the company."

Another alliance has not been so lucky. A joint venture agreement with Japan's Toshiba Corp., to produce one-megabit DRAMs, comes to fruition at the wrong time. Until recently, there had been a shortage of these high-density, low-cost chips, which are primarily used in personal computers. Now, however, supply has increased and prices for DRAM chips have fallen by as much as 40%, according to David Lim, marketing director for Texas Instruments Inc. in Taipei, Taiwan, which also manufactures the chips. □

Home medical devices show healthy sales, sick profits

A growing market for cost-cutting home health care is sweeping the nation; but turning that into profits is a painful process for many medical electronics vendors

BY PETER BURROWS

Spiraling hospitalization costs, a burgeoning class of affluent elderly Americans, and innovative technology have combined to create an accelerating $1 billion-dollar plus U.S. market for home health-care equipment. But while more and more chronically ill and recovering patients are receiving care in the relative comfort of their homes, many vendors of the electronic equipment these patients require are finding the home-care business much less profitable than they had expected.

Home-based treatment requires a wide range of electronic equipment. Beeper-sized cardiac monitors record heartbeat information using various forms of memory. Robotic "nurses" use artificial intelligence to question patients about their condition. Microprocessor-equipped intravenous infusion pumps control the flow of nutrition, drugs or chemotherapy into bedridden or ambulatory patients.

Increasing use of these products has created demand for new generations of components, including downsized power supplies and batteries, rugged electrodes and sensors, and revamped printed circuit boards equipped with telecommunication componentry capable of transmitting patient information from a bedside phone to the doctor's office.

Vendors of these products and devices range from start-ups to giant health-care service companies. Many of these service companies manufacture their own equipment to help contain rising costs. But many of the larger medical electronics vendors, fearful of tightening reimbursement policies by health-insurance providers and by proposed full-scale changes in the nation's health-care system, have opted to wait for the home market to stabilize.

"A lot of companies realize that the home health care business is growing rapidly," says Larry Lindon of McKinsey & Co. Inc., a management consulting firm, "but there are too many uncertainties for most given that the whole structure of the U.S. health industry is under review on a national scale. But most definitely view it as a long-term opportunity."

Marc Berlow

HealthTech Services' Steve Kausman: "Our kind of hardware is only emerging now, and we plan to learn from the mistakes of the past." He also plans to combine hardware and service

Many of these larger suppliers of medical electronics, such as Hewlett-Packard Co., Medtronics Corp. and General Electric Co., do not distinguish the home market from their current, hospital-based lines of business. Some of these companies offer transportable models within certain product lines that can be used in the home, but few have chosen to incur the expense of designing new products or altering production processes.

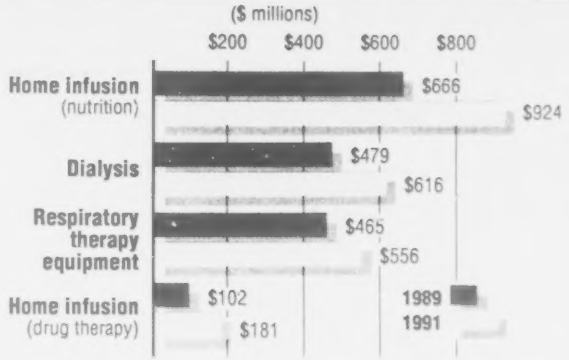
Ronna Borenstein, a spokeswoman for Hewlett-Packard, which earns more than $1 billion in medical electronics annually, says "I've been here over six and a half years, and I've never heard any conversation about marketing to the home health-care market."

This hesitancy belies monumental market growth. Americans increased their health care related expenditures from 7.4% of GNP in 1970 to 11.2% of GNP in 1988, according to Find/SVP, a New York-based market research firm. Much of that growth has been in treatment outside the hospital. Since 1975, expenditures for home care have increased 10.75% annually, to $2 billion in 1988; the number of patients treated at home during this time increased from 500,000 to 1.8 million, the firm reports.

The expanding 65-and-over age bracket, which received 30% of all health insurance payments made in the United States in 1989, will remain the driving force behind this health-care revolution, experts agree. This age group is ex-

pected to grow to 13% of the U.S. population by 2000 from 12.3% in 1987, according to the U.S. Census Bureau. There are currently 30 million people in this category, and 86% of them have some sort of chronic illness, according to a 1985 study by the National Center for Health Statistics. The AIDS epidemic and the increased use of nursing homes, alternative care facilities and hospice centers are also expected to spur the trend toward treatment outside hospital walls.

Hot markets for home health care



Source: Health Industry Manufacturers Association

Market researchers predict market growth in excess of 15% through 1995 for intravenous infusion technologies, rehabilitative pain relief devices and for ventilation machines. "We are still at the pioneering entry-level stage," according to Brad Duarte, product manager at Ault Corp., a Minneapolis-based manufacturer of external power supplies and batteries. "We are at the bottom of the growth curve. The computer has downsized to laptops and now to notebook-sized PCs, and the medical industry is just beginning to go through that same kind of evolution."

No insurance for profits

Despite these heady market projections, the home health-care market has been plagued by shrinking profitability as a result of steep competition, stagnant prices, and tight control of reimbursement payments by insurers. Profit margins fell from 16% in 1982 to 6% in 1986, as vendors came under intense pressure to cut operating costs to meet health care provider requirements, according to a report by management consultant Arthur D. Little's Decision Resources Center.

Meanwhile, prices for medical electronics in general have risen only 3% a year since 1985, according to U.S. Department of Commerce figures. "You have to ask yourself how you are going to recoup your investment in a market where there's so much price pressure," says Patrick Shea, director of marketing for Baxter International Inc., Deerfield, Ill., the overall home health-care market leader. "Especially," he adds, "when technology is advancing so rapidly."

Insurance issues are at the root of industry problems. After a brief period of leniency for home-based treatments in the mid-1980s, insurance providers followed the lead of Medicare and other federal agencies in tightening the purse strings on these procedures. This forced increasingly strapped hospitals and health-care companies to look more selectively before purchasing medical electronics equipment. As a result, only the most cost-effective products are successful for long.

Many health maintenance organizations and the more progressive insurance companies increasingly are willing to reimburse home health-care providers for procedures that may draw patients to their services. Obtaining the approval of Medicare and other federal insurers still remains a daunting but critical task. Not only are these public agencies the source of the largest portion of the total payments made — 39% in 1988 — but they are also a barometer for sentiment regarding reimbursement in general. "Everyone sort of looks to Medicare as a base line," says Baxter's Shea. "When the government talks, people listen."

Obtaining the approval of Medicare and other federal insurers remains a daunting but critical task

Start-ups face an added barrier to entry in the form of exorbitant development costs related to approval by the U.S. Food and Drug Administration and clinical testing. Eric Wachtel, president of MEDphone Corp. of Paramus, N.J., says his company has spent about $5 million on obtaining FDA approval over the past five years.

Room for growth

Despite increasing competition, many vendors have been able to maintain 20% to 30% annual growth. MiniMed Technologies of Sylmar, Calif., a manufacturer of home insulin pumps and low-dose infusion pumps, has enjoyed 50%-plus growth for all of its five-year history, says sales and marketing director Peter Rule.

"I don't have a limited view of the opportunities," he says. "There's plenty of clever things you can do to make your product unique. If you can walk in and show that your product legitimately decreases the amount of nursing intervention necessary, for example, the provider will recognize that it helps him as well as you."

Although uncertainties for the future have slowed the rate of product introductions in many market segments, start-ups have forged a number of promising niches in recent months. Patient monitoring systems, for example, are robotic "nurses" that collect and notify doctors of patients' daily vital statistics, dispense drugs and monitor patient compliance with doctor's orders. The U.S. Department of Labor estimates a shortage of 115,000 trained professionals for home health care by 2000, and these products are designed to make patients as independent as possible. "We're trading labor for capital costs," says Craig George, director of marketing for Northbrook, Illinois-based Buddy Systems Inc.

HANC, a patient monitoring system made by HealthTech Services Corp. of Northbrook, Ill., is designed specifically as a companion for the homebound elderly. The product is equipped with artificial-intelligence-based voice recognition abilities that permit users to tell in English how

they feel; it also collects blood pressure, pulse rate, temperature and a range of other data. The company plans initially to establish itself as a fixture in the "continuous living centers" being constructed as long-term housing for many of the nation's elderly as a more attractive option to nursing homes. The company is currently talking with Marriott Services Group, which has earmarked $1 billion to develop facilities of this kind over the next five years.

Cardiac monitors and defibrillators make up other high-growth markets. These products are marked by innovative technologies and aggressive marketing strategies. Makers of heart monitors are increasingly offering telephonic services; once the device records an instance of irregular heart activity, the data can be transmitted over phone lines with a modem to a message center or directly to a doctor or hospital. Defibrillators, used to revive failing hearts through the use of electric shocks, were formerly confined to hospital rooms. MEDphone offers a briefcase-sized emergency response unit/defibrillator that can be stored at home. "We envision these products to be as common as fire extinguishers are today," says Wachtel. "It'll bypass 911."

Selling services with hardware

Many of these newcomers to the home health-care market are attempting to follow the lead of industry leaders like Baxter by combining hardware with service to buffer themselves from the low margins suffered by equipment vendors in other market segments. Baxter, which dominates the home intravenous infusion business, ensures distribution of its own infusion pumps through its service operation, Caremark.

"Companies that only sell hardware are at a severe disadvantage," says Baxter's Shea. "This is very much a service business that is augmented by technology."

With this harsh reality in mind, companies including HealthTech Services and Buddy Systems offer around-the-clock answering services to receive information from their mechanized nursing aids, as do many manufacturers of telephonic heart monitors. "Our kind of hardware is only emerging now," says HealthTech president Steve Kausman, "and we plan to learn from the mistakes of the past. There's a lot of me-too's that are beating each other over the head in other market segments," he says, attributing it to vendors' inability to understand the highly regional needs of specific markets. "But by combining hardware and service, we think we will put a plug on that happening with us."

But service is a tall order for lean-and-mean manufacturers, say service company veterans. "What it takes to get into the home infusion business, for instance, are the skills of the people who provide the service — the nurses and technicians," says marketing manager Diana Thomas of New England Critical Care, a service-based health-care company in Wood Dale, Mass. "The service side is not that easy . . . there are many, many, many players already divvying up that pot." □

Only the most cost effective will survive

The home health-care market got its first big push in 1983, when Medicare and other federal insurers revamped their policies to try and limit burgeoning hospital-related costs. Federal expenditures had increased from $14 billion in 1970 to an estimated $134 billion in 1988, with 40% being spent at the nation's hospitals. As a result of the new regulations, hospitals no longer were paid on the basis of the claims they filed; instead, a system of diagnosis-related groups (DRGs) was set up to tie reimbursement levels to a pre-determined amount based on the average cost of the diagnosed treatment being performed.

As costs skyrocketed and hospitals continued to outspend their reimbursements, administrators sought ways to care for patients in their homes, where DRGs were not in effect. The home health-care market boomed as a result, enjoying double-digit growth between 1983 and 1986.

"If you came up with something for home treatment that was interesting or had any medical value, a hospital or doctor would buy it because they knew they would be reimbursed," recalls Steve Kausman, president of HealthTech Services Corp., a Northbrook, Ill., maker of an automatic nursing aid.

Soon, however, insurers cast their watchful eyes on the home market as well. Insurance payments to this market were rapidly increasing, from $1.1 billion in 1983 to $2.9 billion in 1987. "Now, it's incumbent that you show the cost benefits of your product," says Philip Benz, monitoring services sales manager for Hillsboro, Oregon-based Instrumetics Corp., a heart monitor manufacturer.

Spurred by this vigilance by insurers, manufacturers have focused their efforts on developing technologies that reduce the need for intensive nursing and monitoring while freeing up hospital beds and equipment. "There is a hope that these new technologies will be able to provide cost-effective home health care that is as good as people can expect in hospitals," says consultant Susan Eustis, a researcher for Frost & Sullivan of New York, N.Y.

Intravenous infusion pumps, blood pressure monitors, and nerve stimulators for pain relief are among the products that have met these standards. One 1984 survey reported by Find/SVP indicated that portable respiratory equipment enabled 258 of 2,000 ventilator-dependent patients to be moved to their homes at a savings of $64.4 million. A 1988 study, also cited by Find/SVP, showed that IV antibiotic infusion can be 73% less costly when performed at home than at a hospital.

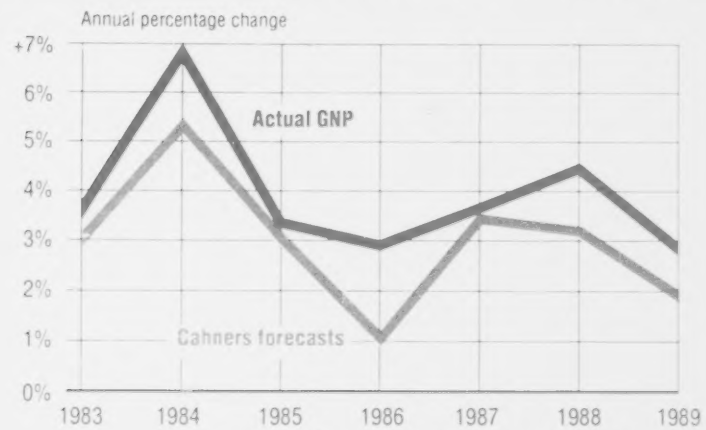
"The general trend is toward home based and even ambulatory devices," says Joe Bane, director of materials management at New England Critical Care, a Massachusetts-based health service company. "Instead of a 10-pound box, we'd have an 18-ounce device that is carried around like a knapsack. Getting [patients] home and back to something approaching their normal lives is the key." □

Blue Chip vs. Cahners: macroeconomic forecasts

Annual percentage change	Blue Chip 1990	Blue Chip 1991	Cahners 1990	Cahners 1991
Real GNP	1.6%	2.5%	2.1%	3.0%
Consumer price index	3.8%	3.5%	3.6%	3.4%
Industrial output	1.8%	2.7%	1.7%	4.7%
Disposable income	1.7%	2.8%	2.2%	4.3%
Business investment	1.9%	2.9%	1.7%	2.6%
Pretax profits	-4.0%	3.0%	4.5%	15.1%

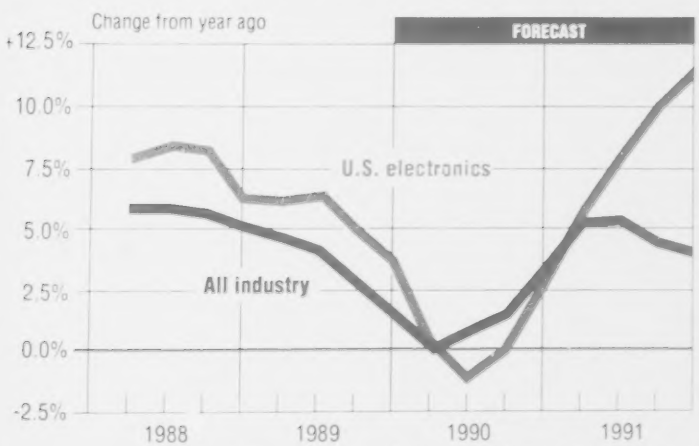
Data source: Blue Chip Economic Indicators; Cahners Economics

Cahners Economics: GNP forecast track record



Data source: U.S. Commerce Department; Forecast: Cahners Economics

U.S. electronics vs. total industrial output



Data source: Federal Reserve Board; Forecast: Cahners Economics

Longest business expansion in history?

If Cahners Economics and 51 forecasters from Blue Chip Economic Indicators are right, the U.S. economy will make history in the next two years with the longest business expansion ever recorded. Cahners Economics, the forecasting arm for ELECTRONIC BUSINESS' parent company, predicts real gross national product will grow 2.1% in 1990 and 3.0% in 1991. The Blue Chip consensus forecasts inflation-adjusted GNP will inch up 1.6% in 1990 and 2.5% in 1991.

A year ago, we reported that 30% of the Blue Chip panel expected a recession in 1990 and another 30% predicted the dreaded "R-word" in 1991. Now those expecting a recession in the next 24 months are in the distinct minority. A "soft landing" has become the most popular projection.

It has long been our contention at Cahners Economics that no force has existed that would push the economy into a full-fledged recession. The Federal Reserve Board so far has negotiated the high-wire act of managing interest rates with relative ease. The U.S. government deficit continues to balloon and we see little serious effort to stem the spending tide. Unemployment remains low, so consumer dollars continue flowing steadily into the economy. Export growth, while slowing, hasn't slowed too much. Supply conditions at manufacturing plants have also been relatively slack for this stage of the current expansion. The end result of these GNP calculations points to slowing growth, but no recession.

Unfortunately for the electronics industry, the weakest economic factor over the next couple of years will be business investment and profits. That means we can expect factory output of electronics goods (components, consumer and military electronics, communication equipment, computers and instruments) to slow down faster and harder than the aggregate industrial economy. Still, investment in information-processing equipment will remain a priority, so expect electronics once again to outpace the industrial market come 1991. Of course, if the U.S. economy does indeed avoid a recession in the next two years, worldwide electronics markets will be in for a period of macroeconomic stability that they've never before experienced.

ELIZABETH B. BAATZ

For more information about Cahners Economics' forecasts and track records, please write Dan Buchan, Cahners Economics, 275 Washington Street, Newton, MA 02158-1630, or call 617-558-4758 or telefax 617-558-4402.

ELECTRONIC BUSINESS leading indicator

Quarterly (rate-of-change)

SPECIAL OFFER: A detailed 12-page background paper is available on the ELECTRONIC BUSINESS leading indicator. To obtain your complimentary copy, please contact Elizabeth Baatz at Cahners Publishing Co., 275 Washington St., Newton, Mass., 02158-1630 USA, telephone (617) 558-4368, fax (617) 558-4402

Monthly (rate-of-change)

In the first half of this year, Cahners Economics expects the ELECTRONIC BUSINESS leading indicator to fluctuate between 100 and 101. Because the indicator started to head up from its cyclical low point in September 1989, the electronics industry can expect to see stable growth this year. The indicator rose from a revised 99.6 in November to 102.3 in December 1989. Bookings for U.S. semiconductors and the semiconductor stock price index contributed the most to this increase.

Source: Cahners Economics

Electronics industry indicators this month

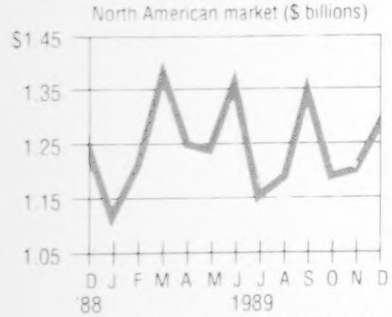
	Latest month	Previous month	Year ago	1988 average
ELECTRONIC BUSINESS leading indicator (rate-of-change, Dec.)	102.3	99.6	101.0	107.7
U.S. semiconductor bookings ($ millions, 3-month average, Dec.)	$1,221	$1,172	$1,146	$1,178
Weekly hours of semiconductor production workers (monthly average, Nov.)	40.9	40.8	40.2	40.2
Electronic components leadtime index (1977 = 100, Jan.)	75.8	89.9	111.9	108.9
S&P's semiconductor stock price index (1970 =10, monthly average, Dec.)	57.9	57.1	45.8	54.4
Change in electronic components inventories ($ millions, SA, Nov.)	+$47	-$48	+$315	+$80
Contracts and orders for plant and equipment ($ billions, SA, Nov.)	$43.2	$41.0	$40.0	$39.7

SA = seasonally adjusted; all other data is not seasonally adjusted

Sources: Semiconductor Industry Association, U.S. Bureau of Labor Statistics, *Electronics Purchasing* magazine, Standard & Poor's, U.S. Commerce Department, U.S. Bureau of Economic Analysis

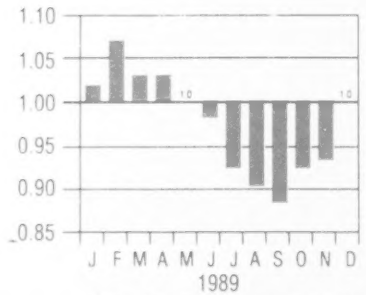
Semiconductor sales

North American market ($ billions)



Source: Semiconductor Industry Association

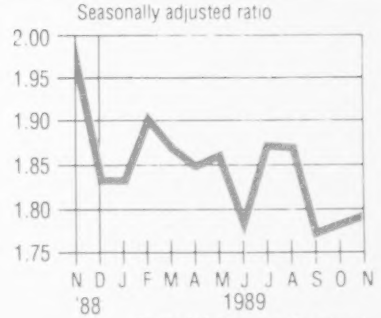
Semiconductor book-to-bill ratio



Source: Semiconductor Industry Association

Component inventory-to-shipments

Seasonally adjusted ratio



Source: U.S. Commerce Department